

# Unregulated Emissions from Catalyst-Equipped Cars: EPA Overview

by Joseph Merenda\*

A number of technical papers have been presented, dealing with a number of different issues. What is required now is to identify the common web interconnecting those papers and to comment on what this new knowledge means.

Dr. Finklea opened the session with the question "who knows what secrets lurk in the closed vaults of government and private research labs?" The purpose of this symposium was to get the information out. I think it has had a significant success in that regard. We have heard a lot of news; in some cases it was good news, in some cases bad news; sometimes, the news appears to be that there's no news.

For example, a technique was described that allows measurement of noble metal burdens in biological tissues at diminutive levels. That's good news. On the other hand, results reported from preliminary studies of noble metal toxicity and tissue storage indicate that certain noble metal compounds are absorbed into the tissues of experimental animals and apparently stored. That, obviously, is bad news. Besides indicating a need for further health effects studies, those observations point to the question of in what forms and quantities noble metals may be emitted in the exhaust of catalyst-equipped

cars. On that critical question we heard little if any news.

In another example, preliminary findings were reported of biological methylation of platinum, which provide cause for concern. However, the plan, detailed by one of the platinum and catalyst suppliers to provide for reclamation and reuse of scrapped noble metal converters, certainly was good news, for such a program should substantially limit the quantities of noble metals available for entry into the biosphere.

## Sulfates

### Measurement Methods

It appears that substantial progress in measurement methods is being made. EPA now has a tentative standard method for automotive sulfate determination. Esso reported on refinements of particulate sampling techniques. Nevertheless, a variety of methods or variations on methods are still in use and the need for cross-checking is as strong as ever. This is particularly so for the condensation and absorption techniques, for the markedly different levels measured with these two techniques still perplex us.

### Emissions Data

There were no real surprises in most of the emissions data we've seen these two

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days. The rough estimate of 0.05 g H<sub>2</sub>SO<sub>4</sub>/mile, made over 6 months ago, assuming 0.03% S fuel, still appears reasonable although perhaps a bit high, since it now appears that control systems designed for the 1975 interim standards may have somewhat lower sulfate emissions than the statutory standards systems most of us have tested to date. This last observation is based on very preliminary data and must be evaluated further.

The high sulfate levels reported for non-catalyst cars using the absorption method are still perplexing, but this appears to be a question to be resolved through measurement method studies.

We owe Dr. Teague of Chrysler a vote of thanks for his provocative paper. A good many of us remain Doubting Thomases when he tells us that lead is good for us, since it keeps the sulfate down, and that bromides are the villains in poisoning catalysts, but I'm sure his paper will set a number of us to thinking and working.

Another area that needs clarification is the phenomenon of sulfur compound storage on catalysts. At this point it is difficult to say which is more desirable, a catalyst with minimal storage that emits sulfates at a relatively constant rate or one with strong storage characteristics that has very low sulfate emissions under some driving conditions and very high emissions when the stored compounds are released. Both better quantification of the storage phenomenon and analysis of the air quality impact of such an effect are necessary.

### Fuel Analysis

In the related area of fuel sulfur levels, some clearly conflicting data were presented. The BuMines data show southern California sulfur levels falling into line with the rest of the country, while the EPA analyses show otherwise. Perhaps more samples will permit us to resolve the differences.

### Control Techniques

In the reviews of gasoline desulfurization, we were told that the required technology is available, but so is the need to act, if we need significant stocks of low sulfur gasoline by the late 1970's.

Unfortunately, we have had no reviews of the potential alternatives to desulfurization, namely, modifications to the catalyst system and the use of traps. EPA is initiating a study of these approaches, but we do not yet know much about their feasibility.

### Noble Metals

When it comes to noble metal emissions, the limitations of our sulfate knowledge appear almost trivial.

We can assume that some quantity, no matter how minute, of noble metals will be emitted. But how much? Here, we don't even know how to measure it. Estimates of automotive platinum emissions (some of them upper bounds) have varied by a factor of 1000. The form in which such emissions occur is completely unknown. In the area of noble metal health effects, it is evident that we are making a start, but it is only a start. Development of control methods must await development of methods to measure the emissions.

### Summary

To try to sum up where we are is, of course, an invitation to controversy, but here is my summation.

About 40 months prior to this conference, the Congress passed and the President signed a major law to attack automobile and other sources of air pollution. Within a year, it became clear that the auto industry was primarily committed to the oxidation catalyst to meet the Congressional mandate. About 15 months prior to this meeting, we first discovered that certain cars equipped with such catalysts had anomalously high particulate emissions—not from the catalyst attri-

tion we were looking for, but apparently from  $\text{H}_2\text{SO}_4$  formation.

Subsequently, in less than a year, EPA was faced with a major decision: was the threat of harm from unregulated emissions strong enough to forego the emission reduction benefits of the catalyst and turn back from the forward momentum of vehicle emission control? The Administrator concluded that the answer was no. But while he urged the industry forward with its program of implementing auto controls, he also urged his agency forward in a program to identify and seek solutions to the threats posed by that technological change.

That program is now beginning to bear fruit—or at least it is starting to blossom. We need to press forward with those efforts, for the technology is being implemented.

In reviewing the results presented at the symposium, I would conclude that they substantiate the correctness of the decisions made last fall. Both the decision to allow initial catalyst use, *and* the decision to subject that technology to an accelerated safety research program.

With respect to sulfates, it was estimated last fall that if no control measures were taken we would have at least one or two

model years before the incremental contribution of automotive sulfates would result in measurable adverse effects. Newer data do not appear to have shortened that time. In fact, such factors as the increased sales fraction of smaller cars with higher fuel economy and the preliminary evidence of lower sulfate emission rates for cars designed to meet the 1975 interim standards should lengthen the time period. If further study validates the latter effect, continuation of the standards at the interim levels for an additional one or two years as is now being considered by the Congress would also provide more time to implement any needed controls. We also have seen that at least one control approach (desulfurization) is feasible with present technology although, of course, at a cost.

With respect to noble metals, the overall picture has not changed dramatically from last fall. We have somewhat more data, but the magnitude of the noble metal loss from catalyst-equipped cars is still unknown, as is the form in which such losses might occur.

Finally, the work to date has substantiated the prudence of the Administrator's decision to accompany initial catalyst use with an accelerated research program. The concerns which have been raised are serious concerns, and demand serious evaluation.